

ENGINEERING REPORT

REPORT NO.	2375
DATE	PAGE OF
Nov. 7, 1978	1 8

The Bendix Corporation

Electrical Components Division

Sidney, New York

TITLE

EVALUATION OF BRUSH CONTACT CONNECTORS WITH
SIMULATED DAMAGE OF BRUSH CONTACT BRISTLES

TYPE

Evaluation

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DATE 11-14-78	DATE 11-14-78	DATE 11-14-78	DATE 11-14-78

I. PURPOSE

The purpose of the testing was to determine the effects of damaged or missing brush contact bristles on the performance of brush contact connectors.

II. CONCLUSIONS

1. The initial mating force for the connector pair containing the intentionally damaged bristles was 37 pounds, or averaged 3.9 ounces/contact pair. The high forces were anticipated because of the opposition that the bent bristles would create during wire bundle engagement. The initial high force was also due, in part, to the alignment method of rigidly mounted connectors. Unmating and mating forces are normally measured on mated connectors that have been fixtured in a fully mated condition.
2. Reducing the number of bristles in motherboard contacts increased the contact resistance in a linear relationship having a slope of approximately .6 milliohms per strand.
3. Deliberately bending or damaging one bristle in either motherboard or daughterboard contacts produced a minimal change in contact resistance.
4. Contact resistance measurements were highest after the initial mating cycle. After 250 cycles, the values were reduced and remained stable throughout the balance of the 1000 cycles of durability.
5. After the first mating-unmating cycle, some skiving of the plastic in the motherboard contact cavities was observed.
6. Visual examination throughout the test sequence evidenced some deflection of the deliberately bent bristles.
7. The latter two conditions remained relatively unchanged throughout the 1000 durability cycles. Overall, the connectors maintained a good visual appearance during the entire test sequence.

III. RECOMMENDATIONS

It is recommended that the mating and unmating forces be considered with regard to the fact that two thirds of the contact mating pairs were physically modified. It should also be noted that the mating and unmating force measurements were not performed from the normally mated condition which establishes initial alignment. Both mating connector halves were rigidly mounted which would oppose the natural alignment of the connectors.

IV. ACTION TAKEN

None

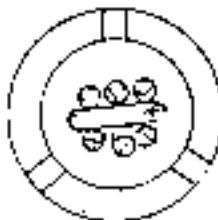
V. DETAILED REPORT

A. Sample Preparation

The following components were submitted for assembly and evaluation:

2 pcs 10-502542-150 Motherboard (MB) Connector Moldings
2 pcs 10-502562-150 Daughterboard (DB) Connector Moldings
300 pcs 10-502402-31 Male Brush Wire Contacts (MB)
150 pcs 10-502400-121 Female Brush Wire Contacts (DB)
150 pcs 10-502400-221 Female Brush Wire Contacts (DB)

Prior to the installation of the contacts into their respective connector moldings, the contacts were modified as shown in Table I. To obtain 6 or 5 wires, one or two bristles were bent out from the bundle at the holder surface and flexed back and forth through an approximate arc of 90° until the strand fractured and broke off. Bent wires were bent through the bristle bunch as shown below.



After contact insertion and bending of the daughterboard tails was accomplished, circuit boards were soldered to each connector half.

TABLE I
CONDITION OF BRUSH WIRES IN SAMPLE CONNECTORS

		Contact Location Identification		
Sample Connector		A1-A25 B1-B25	A26-A50 B26-B50	A51-A75 B51-B75
1	MB	5 Wires	6 Wires	7 Wires
	DB	7 Wires	7 Wires	7 Wires
2	MB	7 Wires	7 Wires 1 Bent	7 Wires
	DB	7 Wires 1 Bent	7 Wires	7 Wires

B. Test Sequence

Photographs of the contacts displaying the intentional bristle damage were taken prior to the initial mating. These photographs are in Appendix B as Figures 1, 2, 3 and 4. Figures 1 and 2 are representative cavities of #2 motherboard connector, cavities A26-A50 and B26-B50. Figures 3 and 4 are representative cavities of #2 daughterboard connector, cavities A1-A25 and B1-B25.

- I. Mating Force - The initial mating force measurement of each connector pair was performed on the Instron Model 1122 force tester. The special motherboard holding fixture was mounted on a ball bearing table attached to the load cell. The L-34119-58 parallel clamping fixture to hold daughterboard connectors was mounted to the crosshead. The connectors were positioned for mating and mated at a rate of 0.100 inch/minute. The mating was stopped when it was apparent that further mating would result in molding to molding interference. The initial mating forces were recorded on Data Sheet 1 of Appendix A. Normally, fixturing for this test is accomplished with the connectors in their fully mated condition. The force to completely separate the connectors is measured first and then the connectors are remated within 0.010 inch of the original fully mated condition.

2. Contact Resistance - Contact resistance measurements were performed on each mating pair of contacts in both mated connector pairs after the initial mating. The Keithly Model 503 Milliohmmeter was used in conjunction with a voltage divider, digital voltmeter and a paper tape punch to record the data. The paper tape punch data was reduced and analyzed via the Hewlett-Packard (H-P) 9820 calculator, printed on tape and placed on data sheets 4, 5 and 6 of Appendix A. All values were less than 11.5 milliohms, except for six measurements in Sample #1, Row B I-25. These six values were less than 13.6 milliohms.
3. Unmating Forces - Initial unmating forces were performed on the Instron 1122 using the same fixturing as for mating forces. The fully mated connectors were separated at a rate of 0.100 inch/minute. The unmating forces are recorded on Data Sheet 1 in Appendix A.
4. Visual Examination - Visual examination at 12X magnification after the initial unmating did not reveal any noticeable contact damage in addition to the deliberate simulated damage at the onset of the test. There was minor skiving of molding material in the contact retention cavities of the #2 motherboard connector. These conditions are specifically noted on Data Sheet 3 in Appendix A. Photographs of some of the representative cavities verify that there was no additional damage incurred. See Figures 4, 5, 6 and 7 in Appendix B.
5. Durability (10 Cycles) - Each connector pair was mated and unmated by hand an additional nine times. The daughterboard connector was rigidly mounted while the motherboard was mated with it.
6. Unmating and Mating Forces - After ten cycles of durability by hand, the unmating and mating force measurements were performed starting with the connectors in the mated condition to assure alignment. The same fixtures and rate application were used as initially. The values are recorded on Data Sheet 1 in Appendix A. The unmating force increased slightly from the initial, but the mating force was reduced approximately fifty percent.

7. Visual Examination - There were some compounded discrepancies noted after ten cycles of durability. The No. 2 Motherboard connector displayed bending of one bristle in three contacts that were deliberately damaged initially. The visual examination was performed at 12X magnification and the comments are recorded on Data Sheet 2 of Appendix A.
8. Durability (250 Cycles) - Each pair of connectors was mated and unmated a total of 250 cycles by hand. The mating and unmating was relatively easy, but it was more difficult with the #2 sample where two thirds of the mated contact population had some type of intentional bristle damage.
9. Unmating and Mating Forces - After 250 cycles of durability, the mated connectors were fixtured on the Instron and unmated mated at a rate of 0.100 inch/minute. The forces required to unmate and mate them increased from those recorded after 10 cycles of durability. Compare the forces recorded on Data Sheet 1 of Appendix A.
10. Contact Resistance - Contact resistance was performed as described in Paragraph No. 2 above, after the 250 cycles of durability conditioning. All values were less than 11.4 milliohms. Individual measurements and statistical analysis are recorded on Data Sheets 7, 8 and 9 in Appendix A. The average resistance of each contact pair-group displayed a decrease of 0.2 milliohms, except Row B control contacts (7 bristles) in #2 connector which increased 0.3 milliohms.
11. Visual Examination - A visual examination of the connectors at 12X magnification revealed no apparent change in either half of the No. 1 sample or the daughterboard half of Sample No. 2. No. 2 motherboard had three additional bristles that were bent to some degree and some minor skiving of the plastic was noted.
12. Sequence Tests (500 Cycles) - Each pair of connectors was mated and unmated by hand an additional 250 times for a total of 500 cycles of durability.

[#] The unmating and mating forces were measured as described in Paragraph No. 9 above. The change in forces of the No. 1 sample were negligible. The forces for the No. 2 sample were reduced. The force values are recorded on Data Sheet 1 in Appendix A and may be compared with other force values.

The contact resistance of each mated contact pair in both connectors was measured and recorded as described in

Paragraph No. 2 above. The average resistance of two groups increased 0.1 milliohms, two were unchanged and eight had a decrease of 0.1 to 0.7 milliohms. The contact resistance values were all less than 11.4 milliohms after 500 cycles of durability and are recorded on Data Sheets 10, 11 and 12 in Appendix A.

A visual examination at 12X magnification revealed minor skiving of the plastic molding in two additional contact cavities in each motherboard connector, as noted on Data Sheet 2 in Appendix A.

(750 Cycles) Each mating pair of connectors was subjected to a total of 750 cycles of durability by hand. The unmating and mating forces were measured as described in Paragraph 9 above. The maximum increase in force from the measurements after 500 cycles of durability was 1.7 pounds. The values are recorded on Data Sheet 1 in Appendix A.

The contact resistance measurements were performed as before and are recorded on Data Sheets 13, 14, and 15 in Appendix A. The average resistance change for any of the twelve contact groups from 500 to 750 cycles of durability was 0.2 milliohms. Four groups were unchanged and the other eight groups varied 0.1 milliohms.

Visual examination at 12X magnification did not reveal any discrepancies in addition to those noted after 500 cycles of durability.

(1000 Cycles) The mating connector pairs were each mated and unmated by hand an additional 250 times for a total of 1000 cycles of durability. The unmating and mating forces were measured as described in Paragraph 9 above. The maximum change in force from 750 cycles of durability was the mating force of the No. 2 sample, an increase of 1.5 pounds. The other force value changes were negligible as noted on Data Sheet 1 in Appendix A.

The contact resistance test was performed as described in Paragraph 2 above and the values were recorded on Data Sheets 16, 17 and 18 in Appendix A. The maximum average resistance change as a result of an additional 250 cycles of durability for six contact groups was 0.2 milliohms. Six groups did not display a change. All values were 11.4 milliohms or less.

The visual examination was performed at 12X magnification. The results are recorded on Data Sheet 3 and may be compared with the initial discrepancy notations. The No. 1 mating halves did not display any significant physical changes. The No. 2 motherboard connector had four bristles that were conspicuously more bent over than when deliberately formed that way for the test. One other bristle in A49 was also bent, but the deliberately bent bristle did not display additional deflection.

Photographs of the No. 2 motherboard, Row A & B 1-25 and No. 2 daughterboard, Rows A & B 26-50 were made to document the changes in bristle bunch configuration and damage. These are represented in Figures 9, 10, 11 and 12 of Appendix B.

A summary of contact resistance mean values for each group throughout the test sequence appears in Table II.

VI. REFERENCES

EWCM G997
Contract #71366-A
CLT 4924
ECL0502-33 through -36
ECL0592A-35 through -51

TABLE II
SUMMARY OF CONTACT RESISTANCE MEASUREMENTS
(MEAN VALUES, N = 25)

Connector #1, Row A

No. of Bristles in MB Contacts	Number of Durability Cycles Completed				
	Initial	250	500	750	1000
5	8.3	7.9	8.0	7.9	8.0
6	7.9	7.3	7.3	7.4	7.4
7	8.0	7.0	7.1	6.9	6.7

Connector #1, Row B

No. of Bristles in MB Contacts	Number of Durability Cycles Completed				
	Initial	250	500	750	1000
5	10.3	9.6	9.6	9.5	9.5
6	9.1	8.8	8.7	8.7	8.7
7	8.7	9.0	8.3	8.3	8.1

Connector #2, Row A

	Number of Durability Cycles Completed				
	Initial	250	500	750	1000
MB Contacts Damaged	7.8	7.3	7.2	7.2	7.2
DB Contacts Damaged	8.3	7.4	7.1	7.1	7.1
Control	7.2	7.0	6.9	7.1	7.0

Connector #2, Row B

	Number of Durability Cycles Completed				
	Initial	250	500	750	1000
MB Contacts Damaged	9.4	8.8	8.7	8.8	8.7
DB Contacts Damaged	9.6	8.6	8.4	8.3	8.4
Control	8.6	8.4	8.3	8.4	8.4

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Electrical Components Division
Sidney, New York

REPORT NO.

2375

PAGE

APPENDIX A
Data Sheets

LABORATORY DATA SHEET

REF. EULM G 997
ECL 0592 -35,-34,-36



Electrical Components Division

Franklin, New York 12438

LISTED BY TR. BAKER
R.D. WAGHORN

ДРУГОЕ ОБЩЕСТВО

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LABORATORY DATA SHEET

TEST	VISUAL EXAMINATION	DATE OF TESTS	REPORT NUMBER
TEST SPECIMEN(S)	10-502542-150 MB (MOTHER BOARD) 10-502562-150 DB (DAUGHTER BOARD)	11-1-78 74°F 41% N/A	2375 ECL0592A-41
TEST EQUIPMENT	WILD M1000	CAL DATE	SPEC.
		N/A	PARA
			SPEC. LIMITS
			TEST CONDITIONS
			ROOM AMBIENT. 12X MAGNIFICATION.

HF 4%

SAMPLE #1 AFTER 10TH UNMATING CYCLE. ONLY ADDITIONAL DISCREPANCIES -
NONE, ONLY CAVITY 35, A ROW MB DISPLAYED SKINNING OF 2 RETENTION TIES
AND POSITIONED CONTACT TOWARD CAVITY WALL AS INITIALLY.

SAMPLE #2 MB AFTER 10TH UNMATING CYCLE

A16 1 WIRE BENT OVER
B26 1 " PARTIALLY BENT OVER } OR INITIALLY AFTER 1 MATING, UNMATING
B49 1 " BENT OVER }

HF 4%

SAMPLE #1 NO CHANGE OF EITHER HALF AFTER 250 CYCLES OF DURABILITY.

SAMPLE #2 MB - ADDITIONAL DISCREPANCIES AFTER 250 CYCLES OF DURABILITY.

A28 SKINNING OF CAVITY - MINOR
A49 2 BRISTLES DAMAGED & MINOR SKINNING OF CAVITY
A45 1 BRISTLE BENT OVER.

#2 DB NO ADDITIONAL DAMAGE.

11-2-78 74°F 28%

SAMPLE #1 DB - NO CHANGE AFTER 500 CYCLES OF DURABILITY.
MB - ADDITIONAL - A1 SKINNING, B74 SKINNING.

SAMPLE #2 DB - NO CHANGE AFTER 500 CYCLES OF DURABILITY.

MB - ADDITIONAL - B35 & B49 MINOR SKINNING.

11-3-78 74°F 36% AFTER 750 CYCLES OF DURABILITY.

SAMPLE #1 DB NO CHANGE AFTER 750 CYCLES OF DURABILITY.

MB " " " " " "

SAMPLE #2 DB " " " " " "

#2 MB " " " " " "

EWOM Q397
ECL0592-35 & -36.



Electrical
Components
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Stamford, Connecticut 06904

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LABORATORY DATA SHEET

TEST	VISUAL EXAMINATION - INITIAL (1000 TH UNMATING)	DATE OF TESTS 11-1-78 11-4-78	REPORT NUMBER 2375
TEST SPECIMEN IS	10-502542-150 MB (MOTHER BOARD)	TEMP SET R.H. +10% ELEV. 33K	ECL 0592A-51 R.M.
10-502562-150 DB (DAUGHTER BOARD)	LT 4924	SPEC.	PARA
TEST EQUIPMENT MODEL #15-97635	CAL DATE N/A	DOU DATE N/A	SPEC LIMITS
WILD MICROSCOPE EATZ2			TEST CONDITIONS ROOM AMBIENT.
			12 X MAGNIFICATION. R. CRANEY OF IBM VIEWED AFTER 1000 CYCLES OF DURABILITY BY HAND.

INITIAL UNMATING

SAMPLE #1 MB-B74 - ONE BRISTLE OUT TOWARD CAVITY WALL

A35 - TWO TIMES DISPLAYED SKIVING, ROLLING MOLDING MATERIAL
DOWN INTO CAVITY.

B45 - HAD ONLY 5 BRISTLES INSTEAD OF PLANNED SIX.
PREPARED 5/6 BRISTLE CONTACTS LOOKED GOOD.

#1 DB - O.K.

SAMPLE #2 MB - CAVITIES A26, A29, A45, B27, B37, B41 AND B45 DISPLAYED
MINOR SKIVING OF MOLDING AT BASE OF RETENTION TINES.
NO CHANGE APPARENT OF THE PREPARED BENT WIRES. (BRISTLES).

#2 DB - O.K. - NO CHANGE APPARENT OF THE PREPARED BENT BRISTLES.

AFTER 1000 CYCLES OF DURABILITY.

SAMPLE #1 ME - A35 SKIVING OF TWO TIMES.

- A1 " (MINOR).
- B74 " (MINOR).

PREPARED 5/6 BRISTLE CONTACTS, NO DAMAGE, LOOK GOOD.

DB - O.K., NO DAMAGE, NO APPARENT CHANGE.

SAMPLE #2 MB - CAVITIES DISPLAYED SKIVING IN VARYING DEGREES:

A26, A28, A29, A35, A44, A45, B27, B35, B37, B41, B45, B42.

A46 WIRE BRISTLE BENT OVER.

A49 ONE BRISTLE BENT OVER.

A26 " " " "

A49 TWO " (3) " "

A45 ONE " " "

DB - O.K., NO DAMAGE, NO APPARENT CHANGE EVEN OF
PREPARED BENT WIRES.

REF EWOM G997.
ECL0592-354-36.



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LABORATORY DATA SHEET

TEST CONTACT RESISTANCE - INITIAL (INITIATING)		DATE OF TESTS 10-19-78	REPORT NUMBER 2375
TEST SPECIMEN ISI 10-502542-1 SMC, 10-502542-150 DE	LT. -492.9	TEMP 73°F RH 45%	ECL 0592A-35 FPL
	SPEC.	SPEC. LIMITS	PARA.
TEST EQUIPMENT KEITHLEY 303 MILLIAMMETER E-1462	CAL DATE 2-22-78	OUT DATE 3-8-79	TEST CONDITIONS Room AMBIENT
H-P 3480A DIGITAL VOLTMETER E0392	9-6-78	3-6-79	30 MILLION ^s FULL SCALE $K = 2.292$
H-P 3485A DATA FUNCN E-2102	N/A	N/A	

#1 Row A
1-25

MB 5 WIRES

#1 Row B
1-25

MB 5 WIRES

#1 Row A
26-50

MB 6 WIRES

#1 Row B
26-50

MB - 6 WIRES

NO. OF CHUFFLES	NO. OF SAMPLES	NO. OF SAMPLES	NO. OF SAMPLES
10.0	25	25	25
10.5	10.5	10.5	10.5
11.0	11.0	11.0	11.0
11.5	11.5	11.5	11.5
12.0	12.0	12.0	12.0
12.5	12.5	12.5	12.5
13.0	13.0	13.0	13.0
13.5	13.5	13.5	13.5
14.0	14.0	14.0	14.0
14.5	14.5	14.5	14.5
15.0	15.0	15.0	15.0
15.5	15.5	15.5	15.5
16.0	16.0	16.0	16.0
16.5	16.5	16.5	16.5
17.0	17.0	17.0	17.0
17.5	17.5	17.5	17.5
18.0	18.0	18.0	18.0
18.5	18.5	18.5	18.5
19.0	19.0	19.0	19.0
19.5	19.5	19.5	19.5
20.0	20.0	20.0	20.0
20.5	20.5	20.5	20.5
21.0	21.0	21.0	21.0
21.5	21.5	21.5	21.5
22.0	22.0	22.0	22.0
22.5	22.5	22.5	22.5
23.0	23.0	23.0	23.0
23.5	23.5	23.5	23.5
24.0	24.0	24.0	24.0
24.5	24.5	24.5	24.5
25.0	25.0	25.0	25.0

REF EWOL 0397
ECL0592-35



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LABORATORY DATA SHEET

TEST	CONTACT RESISTANCE - INITIAL (1 ST MATING)	DATE OF TESTS	REPORT NUMBER
TEST SPECIMEN ISI	10-502592-150MB, 10-502562-150DB	TEMP RH 73°F 49%	ECT 0592A - 36 SERIAL
TEST EQUIPMENT	KELVIN 503 MILLION ohm METER F-1662	CAL DATE 2-22-78	DUE DATE 3-8-79
H-P 3480A DIGITAL VOLTMETER F-0392	9.6-78	3-6-79	TEST CONDITIONS ROOM AMBIENT, 30 MILLION OHM FULL SCALE K= 2.292
H-P 3489A DATA PUNCH F-2103	N/A	N/A	

#2 Row A

t=25

2004 ENT WOR

#2 Row B

七

23 / 30

$$\# \geq 2^{\log_2 A}$$

A. R. D.

卷之三

43  

280

26-30

	1990	1991	1992	1993	1994
1. Total	100.0	100.0	100.0	100.0	100.0
2. Direct	80.0	80.0	80.0	80.0	80.0
3. Indirect	20.0	20.0	20.0	20.0	20.0
4. Direct	18.0	18.0	18.0	18.0	18.0
5. Indirect	12.0	12.0	12.0	12.0	12.0
6. Direct	10.0	10.0	10.0	10.0	10.0
7. Indirect	8.0	8.0	8.0	8.0	8.0
8. Direct	6.0	6.0	6.0	6.0	6.0
9. Indirect	4.0	4.0	4.0	4.0	4.0
10. Direct	4.0	4.0	4.0	4.0	4.0
11. Indirect	2.0	2.0	2.0	2.0	2.0
12. Direct	2.0	2.0	2.0	2.0	2.0
13. Indirect	1.0	1.0	1.0	1.0	1.0
14. Direct	1.0	1.0	1.0	1.0	1.0
15. Indirect	0.5	0.5	0.5	0.5	0.5
16. Direct	0.5	0.5	0.5	0.5	0.5
17. Indirect	0.2	0.2	0.2	0.2	0.2
18. Direct	0.2	0.2	0.2	0.2	0.2
19. Indirect	0.1	0.1	0.1	0.1	0.1
20. Direct	0.1	0.1	0.1	0.1	0.1
21. Indirect	0.05	0.05	0.05	0.05	0.05

NO. OF SAMPLES	NO. OF SAMPLES	NO. OF SAMPLES	NO. OF SAMPLES
27	30	27	25
MAXIMUM =	30.0000	10.00	NO. 1000
MEAN =	10.74	10.70	10.7
STANDARD DEVIATION =	8.12	9.16	9.4
MINIMUM =	0.0000	0.0000	0.0000
SD/MEAN =	7.57	8.42	8.7
SD/SD =	1.00	1.00	1.0
SD/CL =	0.0000	0.0000	0.0000
CL =	10.0	10.0	10.0

REF. EWON G937
ECL0592-35.



**Electrical
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S-Data, New York 100-100

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LABORATORY DATA SHEET

TEST CONTACT RESISTANCE AFTER 250 CYCLES OF DURABILITY		DATE OF TESTS 11 / 178	REPORT NUMBER 2375
TEST SPECIMEN ISI 10-502552-100NIS, ID 502562-150 ZR	LT 4924	TEMP 77°F	ECL 0592-38
		R.H. 32%	FPM PARA.
TEST EQUIPMENT KEITHLY 203 MILLIAMMETER F-1142	CAL DATE 2-22-78	DOE DATE 3-8-79	SPEC. LIMITS
H-P 3480A DIGITAL VOLTMETER F-03392	9-6-78	3-6-79	TEST CONDITIONS Room AMBIENT
H-P 3483A DATA PUNCH F-2103	n/a	n/a	30 MILLIONMS FULL SCALE
			K-2.292

#1 Row A

1-25

NO 5 WIRES

#1 Row B

1-25

MB 5 WIRES

#1 Row A

26-50

MB 6 WIRES

#1 Row B

26-50

MB 6 WIRES

1-1	1-1	1-1	1-1
1-2	1-2	1-2	1-2
1-3	1-3	1-3	1-3
1-4	1-4	1-4	1-4
1-5	1-5	1-5	1-5
1-6	1-6	1-6	1-6
1-7	1-7	1-7	1-7
1-8	1-8	1-8	1-8
1-9	1-9	1-9	1-9
1-10	1-10	1-10	1-10
1-11	1-11	1-11	1-11
1-12	1-12	1-12	1-12
1-13	1-13	1-13	1-13
1-14	1-14	1-14	1-14
1-15	1-15	1-15	1-15
1-16	1-16	1-16	1-16
1-17	1-17	1-17	1-17
1-18	1-18	1-18	1-18
1-19	1-19	1-19	1-19
1-20	1-20	1-20	1-20
1-21	1-21	1-21	1-21
1-22	1-22	1-22	1-22
1-23	1-23	1-23	1-23
1-24	1-24	1-24	1-24
1-25	1-25	1-25	1-25

NO. OF SAMPLES	NO. OF SAMPLES	NO. OF SAMPLES	NO. OF SAMPLES
100	100	100	100
1000	1000	1000	1000
MEAN	MEAN	MEAN	MEAN
STANDARD DEVIATION	STANDARD DEVIATION	STANDARD DEVIATION	STANDARD DEVIATION
MINIMUM	MINIMUM	MINIMUM	MINIMUM
MAXIMUM	MAXIMUM	MAXIMUM	MAXIMUM

REF EWON G997
ECL 0592-35.

Electrical
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LABORATORY DATA SHEET

TEST	CONTACT RESISTANCE - AFTER 250 CYCLES OF DURABILITY	DATE OF TESTS	REPORT NUMBER
TEST SPECIMEN	10-502542-150AG, 10-502562-150 DS	11-1-78	2375
		TEMP 14.3 75°F 32.6 CAL	EC10392A-39
	LIT 0324	SPEC.	VARA
TEST EQUIPMENT	KELVIN MODEL 003 MILLIAMMETER CAT DATE 2-22-78 DUE DATE 3-8-79	SPEC. LIMITS	
H-P 3480A DIGITAL VOLTMETER	E-0592	3-4-78	3-6-78
H-P 3989A DATA MUNCH	E-2103	N/A	N/A
			K-2-292

#2 Row A
1-25
DB 1 BENT WIRES

#2 Row B
1-25
DB 1 BENT WIRES

#2 Row A
26-50
MB 1 BENT WIRES

#2 Row B
26-50
MB 1 BENT WIRES

| NO. OF SAMPLES = |
|------------------|------------------|------------------|------------------|
| 25 | 15 | 25 | 25 |
| MAXIMUM = | MINIMUM = | MAXIMUM = | MINIMUM = |
| 9.4 | 8.0 | 10.1 | 10.0 |
| MEAN = | STD. DEVI. = | MEAN = | MEAN = |
| 7.0 | 0.6 | 7.0 | 0.6 |
| MINIMUM = | MAXIMUM = | MINIMUM = | MINIMUM = |
| 6.5 | 7.6 | 6.7 | 7.1 |
| STD. DEVI. = | STD. DEVI. = | STD. DEVI. = | STD. DEVI. = |
| 0.6 | 0.6 | 0.7 | 0.7 |
| U.C.L. = | L.C.L. = | U.C.L. = | L.C.L. = |
| 8.0 | 6.0 | 8.0 | 7.0 |

REF EWOM G997.
EC10392-35.



Electrical
Components
Division

SoHo, New York 10013

TESTED BY TR. BARRY
R. D. WAGHORN

APPROVED BY

WITNESSED BY

LABORATORY DATA SHEET

TEST	CONTACT RESISTANCE - AFTER 250 CYCLES OF DURABILITY	DATE OF TESTS	REPORT NUMBER
TEST SPECIMEN IS:	10-502572-150 MILS, 10-502562-150 IDN	11-1-78	2375
TEST EQUIPMENT	KELVIN MODEL 003 MILLIONOHMER, AT DATE F-1362 12-22-78 13-9-79	TEMP 75°F 14°C 75°F 32°C SPEC.	1610592A-40 PSRA
H-P 3480A DIGITAL VOLTMETER	F-0392 13-6-78 13-6-79	TEST CONDITIONS	Room Ambient
H-P 3489A DATA MUNCH	F-2105 N/A N/A	30 MILLIONHRS Full Scale	K-2-292

#1 Row A	#1 Row B	#2 Row A	#2 Row B
51-75	51-75	51-75	51-75
7 WIRES	7 WIRES	7 WIRES	7 WIRES
51-76	51-76	51-76	51-76
51-77	51-77	51-77	51-77
51-78	51-78	51-78	51-78
51-79	51-79	51-79	51-79
51-80	51-80	51-80	51-80
51-81	51-81	51-81	51-81
51-82	51-82	51-82	51-82
51-83	51-83	51-83	51-83
51-84	51-84	51-84	51-84
51-85	51-85	51-85	51-85
51-86	51-86	51-86	51-86
51-87	51-87	51-87	51-87
51-88	51-88	51-88	51-88
51-89	51-89	51-89	51-89
51-90	51-90	51-90	51-90
51-91	51-91	51-91	51-91
51-92	51-92	51-92	51-92
51-93	51-93	51-93	51-93
51-94	51-94	51-94	51-94
51-95	51-95	51-95	51-95
51-96	51-96	51-96	51-96
51-97	51-97	51-97	51-97
51-98	51-98	51-98	51-98
51-99	51-99	51-99	51-99
51-100	51-100	51-100	51-100
51-101	51-101	51-101	51-101

NO. OF SAMPLES	NO. OF UNITS	NO. OF SAMPLES	NO. OF UNITS
15	15	15	25
MEAN=	51.4	MEAN=	10.4
MINIMUM=	7.13	MINIMUM=	8.4
STD. DEV.=	8.01 11.7%	STD. DEV.=	2.5 25%
U.C.L.=	11.11	U.C.L.=	9.4

TESTED BY J.R. SPARRE W.D. WAGNER APPROVED BY WITNESSED BY	Bendix Electrical Components Division Sparta, New Jersey 07086
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LABORATORY DATA SHEET

TEST	CONTACT RESISTANCE - AFTER 500 CYCLES OF DURABILITY	DATE OF TESTS	REPORT NUMBER
TEST SPECIMEN ISI	10-502572-150 MIL, 10-502562-150 DB	11-2-78	2375
TEST EQUIPMENT	KELLY MODEL 503 AMMETER	TEMP 74°F RH 28% SPEC	ECLO592A-42 CAL TARA
H-P 3480A DIGITAL VOLTMETER	F-0392	9-1-78	3-6-79
H-P 3989A DATA MUNCH	F-2103	N/A	N/A
			K-1-292

#1 Row A

1-25

MB 5 WIRES

#1 Row B

1-25

MB 5 WIRES

#1 Row A

26-50

MB 6 WIRES

#1 Row B

26-50

MB 6 WIRES

1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5
1.6	1.6	1.6	1.6
1.7	1.7	1.7	1.7
1.8	1.8	1.8	1.8
1.9	1.9	1.9	1.9
2.0	2.0	2.0	2.0
2.1	2.1	2.1	2.1
2.2	2.2	2.2	2.2
2.3	2.3	2.3	2.3
2.4	2.4	2.4	2.4
2.5	2.5	2.5	2.5
2.6	2.6	2.6	2.6
2.7	2.7	2.7	2.7
2.8	2.8	2.8	2.8
2.9	2.9	2.9	2.9
3.0	3.0	3.0	3.0
3.1	3.1	3.1	3.1
3.2	3.2	3.2	3.2
3.3	3.3	3.3	3.3
3.4	3.4	3.4	3.4
3.5	3.5	3.5	3.5
3.6	3.6	3.6	3.6
3.7	3.7	3.7	3.7
3.8	3.8	3.8	3.8
3.9	3.9	3.9	3.9
4.0	4.0	4.0	4.0
4.1	4.1	4.1	4.1
4.2	4.2	4.2	4.2
4.3	4.3	4.3	4.3
4.4	4.4	4.4	4.4
4.5	4.5	4.5	4.5
4.6	4.6	4.6	4.6
4.7	4.7	4.7	4.7
4.8	4.8	4.8	4.8
4.9	4.9	4.9	4.9
5.0	5.0	5.0	5.0
5.1	5.1	5.1	5.1
5.2	5.2	5.2	5.2
5.3	5.3	5.3	5.3
5.4	5.4	5.4	5.4
5.5	5.5	5.5	5.5
5.6	5.6	5.6	5.6
5.7	5.7	5.7	5.7
5.8	5.8	5.8	5.8
5.9	5.9	5.9	5.9
6.0	6.0	6.0	6.0
6.1	6.1	6.1	6.1
6.2	6.2	6.2	6.2
6.3	6.3	6.3	6.3
6.4	6.4	6.4	6.4
6.5	6.5	6.5	6.5
6.6	6.6	6.6	6.6
6.7	6.7	6.7	6.7
6.8	6.8	6.8	6.8
6.9	6.9	6.9	6.9
7.0	7.0	7.0	7.0
7.1	7.1	7.1	7.1
7.2	7.2	7.2	7.2
7.3	7.3	7.3	7.3
7.4	7.4	7.4	7.4
7.5	7.5	7.5	7.5
7.6	7.6	7.6	7.6
7.7	7.7	7.7	7.7
7.8	7.8	7.8	7.8
7.9	7.9	7.9	7.9
8.0	8.0	8.0	8.0
8.1	8.1	8.1	8.1
8.2	8.2	8.2	8.2
8.3	8.3	8.3	8.3
8.4	8.4	8.4	8.4
8.5	8.5	8.5	8.5
8.6	8.6	8.6	8.6
8.7	8.7	8.7	8.7
8.8	8.8	8.8	8.8
8.9	8.9	8.9	8.9
9.0	9.0	9.0	9.0
9.1	9.1	9.1	9.1
9.2	9.2	9.2	9.2
9.3	9.3	9.3	9.3
9.4	9.4	9.4	9.4
9.5	9.5	9.5	9.5
9.6	9.6	9.6	9.6
9.7	9.7	9.7	9.7
9.8	9.8	9.8	9.8
9.9	9.9	9.9	9.9
10.0	10.0	10.0	10.0
10.1	10.1	10.1	10.1
10.2	10.2	10.2	10.2
10.3	10.3	10.3	10.3
10.4	10.4	10.4	10.4
10.5	10.5	10.5	10.5
10.6	10.6	10.6	10.6
10.7	10.7	10.7	10.7
10.8	10.8	10.8	10.8
10.9	10.9	10.9	10.9
11.0	11.0	11.0	11.0
11.1	11.1	11.1	11.1
11.2	11.2	11.2	11.2
11.3	11.3	11.3	11.3
11.4	11.4	11.4	11.4
11.5	11.5	11.5	11.5
11.6	11.6	11.6	11.6
11.7	11.7	11.7	11.7
11.8	11.8	11.8	11.8
11.9	11.9	11.9	11.9
12.0	12.0	12.0	12.0
12.1	12.1	12.1	12.1
12.2	12.2	12.2	12.2
12.3	12.3	12.3	12.3
12.4	12.4	12.4	12.4
12.5	12.5	12.5	12.5
12.6	12.6	12.6	12.6
12.7	12.7	12.7	12.7
12.8	12.8	12.8	12.8
12.9	12.9	12.9	12.9
13.0	13.0	13.0	13.0
13.1	13.1	13.1	13.1
13.2	13.2	13.2	13.2
13.3	13.3	13.3	13.3
13.4	13.4	13.4	13.4
13.5	13.5	13.5	13.5
13.6	13.6	13.6	13.6
13.7	13.7	13.7	13.7
13.8	13.8	13.8	13.8
13.9	13.9	13.9	13.9
14.0	14.0	14.0	14.0
14.1	14.1	14.1	14.1
14.2	14.2	14.2	14.2
14.3	14.3	14.3	14.3
14.4	14.4	14.4	14.4
14.5	14.5	14.5	14.5
14.6	14.6	14.6	14.6
14.7	14.7	14.7	14.7
14.8	14.8	14.8	14.8
14.9	14.9	14.9	14.9
15.0	15.0	15.0	15.0
15.1	15.1	15.1	15.1
15.2	15.2	15.2	15.2
15.3	15.3	15.3	15.3
15.4	15.4	15.4	15.4
15.5	15.5	15.5	15.5
15.6	15.6	15.6	15.6
15.7	15.7	15.7	15.7
15.8	15.8	15.8	15.8
15.9	15.9	15.9	15.9
16.0	16.0	16.0	16.0
16.1	16.1	16.1	16.1
16.2	16.2	16.2	16.2
16.3	16.3	16.3	16.3
16.4	16.4	16.4	16.4
16.5	16.5	16.5	16.5
16.6	16.6	16.6	16.6
16.7	16.7	16.7	16.7
16.8	16.8	16.8	16.8
16.9	16.9	16.9	16.9
17.0	17.0	17.0	17.0
17.1	17.1	17.1	17.1
17.2	17.2	17.2	17.2
17.3	17.3	17.3	17.3
17.4	17.4	17.4	17.4
17.5	17.5	17.5	17.5
17.6	17.6	17.6	17.6
17.7	17.7	17.7	17.7
17.8	17.8	17.8	17.8
17.9	17.9	17.9	17.9
18.0	18.0	18.0	18.0
18.1	18.1	18.1	18.1
18.2	18.2	18.2	18.2
18.3	18.3	18.3	18.3
18.4	18.4	18.4	18.4
18.5	18.5	18.5	18.5
18.6	18.6	18.6	18.6
18.7	18.7	18.7	18.7
18.8	18.8	18.8	18.8
18.9	18.9	18.9	18.9
19.0	19.0	19.0	19.0
19.1	19.1	19.1	19.1
19.2	19.2	19.2	19.2
19.3	19.3	19.3	19.3
19.4	19.4	19.4	19.4
19.5	19.5	19.5	19.5
19.6	19.6	19.6	19.6
19.7	19.7	19.7	19.7
19.8	19.8	19.8	19.8
19.9	19.9	19.9	19.9
20.0	20.0	20.0	20.0
20.1	20.1	20.1	20.1
20.2	20.2	20.2	20.2
20.3	20.3	20.3	20.3
20.4	20.4	20.4	20.4
20.5	20.5	20.5	20.5
20.6	20.6	20.6	20.6
20.7	20.7	20.7	20.7
20.8	20.8	20.8	20.8
20.9	20.9	20.9	20.9
21.0	21.0	21.0	21.0
21.1	21.1	21.1	21.1
21.2	21.2	21.2	21.2
21.3	21.3	21.3	21.3
21.4	21.4	21.4	21.4
21.5	21.5	21.5	21.5
21.6	21.6	21.6	21.6
21.7	21.7	21.7	21.7
21.8	21.8	21.8	21.8
21.9	21.9	21.9	21.9
22.0	22.0	22.0	22.0
22.1	22.1	22.1	22.1
22.2	22.2	22.2	22.2
22.3	22.3	22.3	22.3
22.4	22.4	22.4	22.4
22.5	22.5	22.5	22.5
22.6	22.6	22.6	22.6
22.7	22.7	22.7	22.7
22.8	22.8	22.8	22.8
22.9	22.9	22.9	22.9
23.0	23.0	23.0	23.0
23.1	23.1	23.1	23.1
23.2	23.2	23.2	23.2
23.3	23.3	23.3	23.3
23.4	23.4	23.4	23.4
23.5	23.5	23.5	23.5
23.6	23.6	23.6	23.6
23.7	23.7	23.7	23.7
23.8	23.8	23.8	23.8
23.9	23.9	23.9	23.9
24.0	24.0	24.0	24.0
24.1	24.1	24.1	24.1
24.2	24.2	24.2	24.2
24.3	24.3	24.3	24.3
24.4	24.4	24.4	24.4
24.5	24.5	24.5	24.5
24.6	24.6	24.6	24.6
24.7	24.7	24.7	24.7
24.8	24.8	24.8	24.8
24.9	24.9	24.9	24.9
25.0	25.0	25.0	25.0
25.1	25.1	25.1	25.1
25.2	25.2	25.2	25.2
25.3	25.3	25.3	25.3
25.4	25.4	25.4	25.4
25.5	25.5	25.5	25.5
25.6	25.6	25.6	25.6
25.7	25.7	25.7	25.7
25.8	25.8	25.8	25.8
25.9	25.9	25.9	25.9
26.0	26.0	26.0	26.0
26.1	26.1	26.1	26.1
26.2	26.2	26.2	26.2
26.3	26.3	26.3	26.3
26.4	26.4	26.4	26.4
26.5	26.5	26.5	26.5
26.6	26.6	26.6	26.6
26.7	26.7	26.7	26.7
26.8	26.8	26.8	26.8
26.9	26.9	26.9	26.9
27.0	27.0	27.0	27.0
27.1	27.1	27.1</td	

LABORATORY DATA SHEET

TEST	CONTACT RESISTANCE - AFTER 500 CYCLES OF BENDIBILITY	DATE OF TESTS	REPORT NUMBER
TEST SPECIMEN	10-502542-150A45, 10-502562-150D8	11-2-78	2375
		TEMP 74°F 128.76°C	ECLOG24-43
	LT 4324	SPEC.	722A
TEST EQUIPMENT	KEMMLY MODEL 503 MILLIONOMETER CAL DATE 1-22-78 USE DATE 3-9-79	SPEC. LIMITS	
H-P 3180A DIGITAL VOLTMETER	F-5392	3-6-78	3-6-79
H-P 3489A DATA PUNCH	F-2103	N/A	N/A
			K=2.292

#2 Row A	#2 Row B	#2 Row A	#2 Row B
1-25	1-25	26-50	26-50
DB 1 BENT WIRE	DB 1 BENT WIRE	MB 1 BENT WIRE	MB 1 BENT WIRE
1.0	1.0	1.0	1.0
1.1	1.1	1.1	1.1
1.2	1.2	1.2	1.2
1.3	1.3	1.3	1.3
1.4	1.4	1.4	1.4
1.5	1.5	1.5	1.5
1.6	1.6	1.6	1.6
1.7	1.7	1.7	1.7
1.8	1.8	1.8	1.8
1.9	1.9	1.9	1.9
2.0	2.0	2.0	2.0
2.1	2.1	2.1	2.1
2.2	2.2	2.2	2.2
2.3	2.3	2.3	2.3
2.4	2.4	2.4	2.4
2.5	2.5	2.5	2.5
2.6	2.6	2.6	2.6
2.7	2.7	2.7	2.7
2.8	2.8	2.8	2.8
2.9	2.9	2.9	2.9
3.0	3.0	3.0	3.0
3.1	3.1	3.1	3.1
3.2	3.2	3.2	3.2
3.3	3.3	3.3	3.3
3.4	3.4	3.4	3.4
3.5	3.5	3.5	3.5
3.6	3.6	3.6	3.6
3.7	3.7	3.7	3.7
3.8	3.8	3.8	3.8
3.9	3.9	3.9	3.9
4.0	4.0	4.0	4.0
4.1	4.1	4.1	4.1
4.2	4.2	4.2	4.2
4.3	4.3	4.3	4.3
4.4	4.4	4.4	4.4
4.5	4.5	4.5	4.5
4.6	4.6	4.6	4.6
4.7	4.7	4.7	4.7
4.8	4.8	4.8	4.8
4.9	4.9	4.9	4.9
5.0	5.0	5.0	5.0
5.1	5.1	5.1	5.1
5.2	5.2	5.2	5.2
5.3	5.3	5.3	5.3
5.4	5.4	5.4	5.4
5.5	5.5	5.5	5.5
5.6	5.6	5.6	5.6
5.7	5.7	5.7	5.7
5.8	5.8	5.8	5.8
5.9	5.9	5.9	5.9
6.0	6.0	6.0	6.0
6.1	6.1	6.1	6.1
6.2	6.2	6.2	6.2
6.3	6.3	6.3	6.3
6.4	6.4	6.4	6.4
6.5	6.5	6.5	6.5
6.6	6.6	6.6	6.6
6.7	6.7	6.7	6.7
6.8	6.8	6.8	6.8
6.9	6.9	6.9	6.9
7.0	7.0	7.0	7.0
7.1	7.1	7.1	7.1
7.2	7.2	7.2	7.2
7.3	7.3	7.3	7.3
7.4	7.4	7.4	7.4
7.5	7.5	7.5	7.5
7.6	7.6	7.6	7.6
7.7	7.7	7.7	7.7
7.8	7.8	7.8	7.8
7.9	7.9	7.9	7.9
8.0	8.0	8.0	8.0
8.1	8.1	8.1	8.1
8.2	8.2	8.2	8.2
8.3	8.3	8.3	8.3
8.4	8.4	8.4	8.4
8.5	8.5	8.5	8.5
8.6	8.6	8.6	8.6
8.7	8.7	8.7	8.7
8.8	8.8	8.8	8.8
8.9	8.9	8.9	8.9
9.0	9.0	9.0	9.0
9.1	9.1	9.1	9.1
9.2	9.2	9.2	9.2
9.3	9.3	9.3	9.3
9.4	9.4	9.4	9.4
9.5	9.5	9.5	9.5
9.6	9.6	9.6	9.6
9.7	9.7	9.7	9.7
9.8	9.8	9.8	9.8
9.9	9.9	9.9	9.9
10.0	10.0	10.0	10.0

NO. OF SAMPLES	% OF SAMPLES	NO. OF SAMPLES	% OF SAMPLES
100	100%	100	100%
MEAN =	100.11014	MEAN =	100.11014
STDEV =	0.0001	STDEV =	0.0001
MINIMA =	100.00000	MAXIMA =	100.22000
STD. DEV. =	0.000000000000000	STD. DEV. =	0.000000000000000
CV, % =	0.000000000000000	CV, % =	0.000000000000000

REF: EWON G997.
ECLOG2-36.



Electrical
Components
Division

Stamford, Connecticut 06908

TESTED BY C.R. BAIRD

R.D. WAGHORN

APPROVED BY

WITNESSED BY

LABORATORY DATA SHEET

TEST	CONTACT RESISTANCE - AFTER 500 CYCLES OF DURABILITY		DATE OF TESTS	REPORT NUMBER
TEST SPECIMEN	10-502542-150M13, 10-502552-150DB		11-2-78	2375
			TEMP 70°F 12 H 28%	1005924-44
		4924	SPEC.	PASA
TEST EQUIPMENT	KELVIN MODEL 503 MILLIONOMETER CAL DATE	DUE DATE	SPEC. LIMITS	
	F-1162 1-22-78	3-8-79		
H-P 3480A DIGITAL VOLTMETER	F-0392	9-6-78	TEST CONDITIONS	
H-P 3489A DATA MUNCH	F-2103	N/A	Room Ambient	
			30 MILLIONADS FULL SCALE	
			$K=2.292$	

#1 RowA

51-75
7 WIRES

#1 RowB

51-75
7 WIRES

#2 RowA

51-75
7 WIRES

#2 RowB

51-75
7 WIRES

NO. OF SAMPLES	% OF SAMPLES	NO. OF SAMPLES	% OF SAMPLES
00010014	0000000000000000	00010014	0000000000000000
MEAN =	7.5	MEAN =	7.5
STDEV.	0.1	STDEV.	0.1
STD. DEV. %	1.3	STD. DEV. %	1.3
A.G.L.E.	0.4	A.G.L.E.	0.4

EWON G357.
ECL0592-36.



Electrical
Components
Division

Stamford, Conn. 06480

TESTED BY G.R. BARNARD
R.D. WAGHORN
APPROVED BY

WITNESSED BY

LABORATORY DATA SHEET

TEST	CONTACT RESISTANCE - AFTER 150 CYCLES OF DURABILITY	DATE OF TESTS	REPORT NUMBER
TEST SPECIMEN ISI 10-502542-150M08 10-502562-150 DE	11-2-78	2375	
	TEMP 25°C	25%	EC16592A-45
	RELATIVE HUMIDITY	100%	
	TEST EQUIPMENT KEITHLY MODEL 503 MILLIAMMETER	INITIAL DATE F-11-62	SPEC. LIMITS
		12-22-78	3-8-79
H-P 3480A DIGITAL VOLTMETER	F-0392	9-1-78	TEST CONDITIONS
H-P 3189A DATA PUNCH	F-2103	N/A	Room Ambient
			30 MILLIONMS Full Scale
			K=2.292

#1 Row A	#1 Row B	#1 Row A	#1 Row B
1-25	1-25	26-50	26-50
MB 5 WIRES	MB 5 WIRES	MB 6 WIRES	MB 6 WIRES
2.1	2.0	2.5	2.5
2.2	2.2	2.5	2.5
2.3	2.5	2.5	2.5
2.4	2.4	2.5	2.5
2.5	2.4	2.5	2.5
2.6	2.4	2.5	2.5
2.7	2.4	2.5	2.5
2.8	2.4	2.5	2.5
2.9	2.4	2.5	2.5
2.10	2.4	2.5	2.5
2.11	2.4	2.5	2.5
2.12	2.4	2.5	2.5
2.13	2.4	2.5	2.5
2.14	2.4	2.5	2.5
2.15	2.4	2.5	2.5
2.16	2.4	2.5	2.5
2.17	2.4	2.5	2.5
2.18	2.4	2.5	2.5
2.19	2.4	2.5	2.5
2.20	2.4	2.5	2.5
2.21	2.4	2.5	2.5
2.22	2.4	2.5	2.5
2.23	2.4	2.5	2.5
2.24	2.4	2.5	2.5
2.25	2.4	2.5	2.5
2.26	2.4	2.5	2.5
2.27	2.4	2.5	2.5
2.28	2.4	2.5	2.5
2.29	2.4	2.5	2.5
2.30	2.4	2.5	2.5
2.31	2.4	2.5	2.5
2.32	2.4	2.5	2.5
2.33	2.4	2.5	2.5
2.34	2.4	2.5	2.5
2.35	2.4	2.5	2.5
2.36	2.4	2.5	2.5
2.37	2.4	2.5	2.5
2.38	2.4	2.5	2.5
2.39	2.4	2.5	2.5
2.40	2.4	2.5	2.5
2.41	2.4	2.5	2.5
2.42	2.4	2.5	2.5
2.43	2.4	2.5	2.5
2.44	2.4	2.5	2.5
2.45	2.4	2.5	2.5
2.46	2.4	2.5	2.5
2.47	2.4	2.5	2.5
2.48	2.4	2.5	2.5
2.49	2.4	2.5	2.5
2.50	2.4	2.5	2.5
2.51	2.4	2.5	2.5
2.52	2.4	2.5	2.5
2.53	2.4	2.5	2.5
2.54	2.4	2.5	2.5
2.55	2.4	2.5	2.5
2.56	2.4	2.5	2.5
2.57	2.4	2.5	2.5
2.58	2.4	2.5	2.5
2.59	2.4	2.5	2.5
2.60	2.4	2.5	2.5
2.61	2.4	2.5	2.5
2.62	2.4	2.5	2.5
2.63	2.4	2.5	2.5
2.64	2.4	2.5	2.5
2.65	2.4	2.5	2.5
2.66	2.4	2.5	2.5
2.67	2.4	2.5	2.5
2.68	2.4	2.5	2.5
2.69	2.4	2.5	2.5
2.70	2.4	2.5	2.5
2.71	2.4	2.5	2.5
2.72	2.4	2.5	2.5
2.73	2.4	2.5	2.5
2.74	2.4	2.5	2.5
2.75	2.4	2.5	2.5
2.76	2.4	2.5	2.5
2.77	2.4	2.5	2.5
2.78	2.4	2.5	2.5
2.79	2.4	2.5	2.5
2.80	2.4	2.5	2.5
2.81	2.4	2.5	2.5
2.82	2.4	2.5	2.5
2.83	2.4	2.5	2.5
2.84	2.4	2.5	2.5
2.85	2.4	2.5	2.5
2.86	2.4	2.5	2.5
2.87	2.4	2.5	2.5
2.88	2.4	2.5	2.5
2.89	2.4	2.5	2.5
2.90	2.4	2.5	2.5
2.91	2.4	2.5	2.5
2.92	2.4	2.5	2.5
2.93	2.4	2.5	2.5
2.94	2.4	2.5	2.5
2.95	2.4	2.5	2.5
2.96	2.4	2.5	2.5
2.97	2.4	2.5	2.5
2.98	2.4	2.5	2.5
2.99	2.4	2.5	2.5
2.100	2.4	2.5	2.5
2.101	2.4	2.5	2.5
2.102	2.4	2.5	2.5
2.103	2.4	2.5	2.5
2.104	2.4	2.5	2.5
2.105	2.4	2.5	2.5
2.106	2.4	2.5	2.5
2.107	2.4	2.5	2.5
2.108	2.4	2.5	2.5
2.109	2.4	2.5	2.5
2.110	2.4	2.5	2.5
2.111	2.4	2.5	2.5
2.112	2.4	2.5	2.5
2.113	2.4	2.5	2.5
2.114	2.4	2.5	2.5
2.115	2.4	2.5	2.5
2.116	2.4	2.5	2.5
2.117	2.4	2.5	2.5
2.118	2.4	2.5	2.5
2.119	2.4	2.5	2.5
2.120	2.4	2.5	2.5
2.121	2.4	2.5	2.5
2.122	2.4	2.5	2.5
2.123	2.4	2.5	2.5
2.124	2.4	2.5	2.5
2.125	2.4	2.5	2.5
2.126	2.4	2.5	2.5
2.127	2.4	2.5	2.5
2.128	2.4	2.5	2.5
2.129	2.4	2.5	2.5
2.130	2.4	2.5	2.5
2.131	2.4	2.5	2.5
2.132	2.4	2.5	2.5
2.133	2.4	2.5	2.5
2.134	2.4	2.5	2.5
2.135	2.4	2.5	2.5
2.136	2.4	2.5	2.5
2.137	2.4	2.5	2.5
2.138	2.4	2.5	2.5
2.139	2.4	2.5	2.5
2.140	2.4	2.5	2.5
2.141	2.4	2.5	2.5
2.142	2.4	2.5	2.5
2.143	2.4	2.5	2.5
2.144	2.4	2.5	2.5
2.145	2.4	2.5	2.5
2.146	2.4	2.5	2.5
2.147	2.4	2.5	2.5
2.148	2.4	2.5	2.5
2.149	2.4	2.5	2.5
2.150	2.4	2.5	2.5
2.151	2.4	2.5	2.5
2.152	2.4	2.5	2.5
2.153	2.4	2.5	2.5
2.154	2.4	2.5	2.5
2.155	2.4	2.5	2.5
2.156	2.4	2.5	2.5
2.157	2.4	2.5	2.5
2.158	2.4	2.5	2.5
2.159	2.4	2.5	2.5
2.160	2.4	2.5	2.5
2.161	2.4	2.5	2.5
2.162	2.4	2.5	2.5
2.163	2.4	2.5	2.5
2.164	2.4	2.5	2.5
2.165	2.4	2.5	2.5
2.166	2.4	2.5	2.5
2.167	2.4	2.5	2.5
2.168	2.4	2.5	2.5
2.169	2.4	2.5	2.5
2.170	2.4	2.5	2.5
2.171	2.4	2.5	2.5
2.172	2.4	2.5	2.5
2.173	2.4	2.5	2.5
2.174	2.4	2.5	2.5
2.175	2.4	2.5	2.5
2.176	2.4	2.5	2.5
2.177	2.4	2.5	2.5
2.178	2.4	2.5	2.5
2.179	2.4	2.5	2.5
2.180	2.4	2.5	2.5
2.181	2.4	2.5	2.5
2.182	2.4	2.5	2.5
2.183	2.4	2.5	2.5
2.184	2.4	2.5	2.5
2.185	2.4	2.5	2.5
2.186	2.4	2.5	2.5
2.187	2.4	2.5	2.5
2.188	2.4	2.5	2.5
2.189	2.4	2.5	2.5
2.190	2.4	2.5	2.5
2.191	2.4	2.5	2.5
2.192	2.4	2.5	2.5
2.193	2.4	2.5	2.5
2.194	2.4	2.5	2.5
2.195	2.4	2.5	2.5
2.196	2.4	2.5	2.5
2.197	2.4	2.5	2.5
2.198	2.4	2.5	2.5
2.199	2.4	2.5	2.5
2.200	2.4	2.5	2.5
2.201	2.4	2.5	2.5
2.202	2.4	2.5	2.5
2.203	2.4	2.5	2.5
2.204	2.4	2.5	2.5
2.205	2.4	2.5	2.5
2.206	2.4	2.5	2.5
2.207	2.4	2.5	2.5
2.208	2.4	2.5	2.5
2.209	2.4	2.5	2.5
2.210	2.4	2.5	2.5
2.211	2.4	2.5	2.5
2.212	2.4	2.5	2.5
2.213	2.4	2.5	2.5
2.214	2.4	2.5	2.5
2.215	2.4	2.5	2.5
2.216	2.4	2.5	2.5
2.217	2.4	2.5	2.5
2.218	2.4	2.5	2.5
2.219	2.4	2.5	2.5
2.220	2.4	2.5	2.5
2.221	2.4	2.5	2.5
2.222	2.4	2.5	2.5
2.223	2.4	2.5	2.5
2.224	2.4	2.5	2.5
2.225	2.4	2.5	2.5
2.226	2.4	2.5	2.5
2.227	2.4	2.5	2.5
2.228	2.4	2.5	2.5
2.229	2.4	2.5	2.5
2.230	2.4	2.5	2.5
2.231	2.4	2.5	2.5
2.232	2.4	2.5	2.5
2.233	2.4	2.5	2.5
2.234	2.4	2.5	2.5
2.235	2.4	2.5	2.5
2.236	2.4	2.5	2.5
2.237	2.4	2.5	2.5
2.238	2.4	2.5	2.5
2.239	2.4	2.5	2.5
2.240	2.4	2.5	2.5
2.241	2.4	2.5	2.5
2.242	2.4	2.5	2.5
2.243	2.4	2.5	2.5
2.244	2.4	2.5	2.5
2.245	2.4	2.5	2.5
2.246	2.4	2.5	2.5
2.247	2.4	2.5	2.5
2.248	2.4	2.5	2.5
2.249	2.4	2.5	2.5
2.250	2.4	2.5	2.5
2.251	2.4	2.5	2.5
2.252	2.4	2.5	2.5
2.253	2.4	2.5	2.5
2.254	2.4	2.5	2.5
2.255	2.4	2.5	2.5
2.256	2.4	2.5	2.5
2.257	2.4	2.5	2.5
2.258	2.4	2.5	2.5
2.259	2.4	2.5	2.5
2.260	2.4	2.5	2.5
2.261	2.4	2.5	2.5
2.262	2.4	2.5	2.5
2.263	2.4	2.5	2.5
2.264	2.4	2.5	2.5
2.265	2.4	2.5	2.5
2.266	2.4	2.5	2.5
2.267	2.4	2.5	2.5
2.268	2.4	2.5	2.5
2.269	2.4	2.5	2.5
2.270	2.4	2.5	2.5
2.271	2.4	2.5	2.5
2.272	2.4	2.5	2.5
2.273	2.4	2.5	2.5
2.274	2.4</		

LABORATORY DATA SHEET

TEST	CONTACT RESISTANCE - AFTER 750 CYCLES OF DURABILITY	DATE OF TESTS	REPORT NUMBER
TEST SPECIMEN ISI	10-502542-150 MB, 10-502542-150 DB	11-2-78	2375
TEST EQUIPMENT	NETTLY MODEL 203 MILLIAMMETER	TEMP RH 81°F 25%	ECLO0024-46
	VAL DATE F-1962 12-22-78	TEST DATE 3-8-79	TESTER SPEC. PARA.
H-P 3480A DIGITAL VOLTMETER	F-0302	3-6-79	TEST CONDITIONS Room Ambient
H-P 3489A DATA PUNCH	F-2103	n/a	30 MILLIONADS FULL SCALE
			K=2.292

#2 Row A
1-25
DB 1 BENT WIRE

#2 Row B
1-25
DB 1 BENT WIRE

#2 Row A
26-50
MB 1 BENT WIRE

#2 Row B
26-50
MB 1 BENT WIRE

| NO. OF SAMPLES = |
|------------------|------------------|------------------|------------------|
| 25 | 25 | 25 | 25 |
| MAXIMUM - | 96.1000± | 160.000± | 160.000± |
| MEAN ± | 96.1 | 96.7 | 96.7 |
| MINIMUM - | 96.0000± | 96.3 | 96.3 |
| STD. DEV. ± | 0.4 | 0.7 | 0.7 |
| Q.C.L. ± | 0.1 | 0.1 | 0.1 |

EWON G997.
ECLO0024-36.



Electrical
Components
Division

Edison, New Jersey 07003

TESTED BY DR. BIRD

R. D. WAGNER

APPROVED BY

WITNESSED BY

LABORATORY DATA SHEET

TEST	CONTACT RESISTANCE - AFTER 750 CYCLES OF DURABILITY	DATE OF TESTS	REPORT NUMBER
TEST SPECIMEN ISI	10-502542-150 MBS, 10-502532-150 MBS	11-2-78 TEMP 62°F 14H RH 25%	2375 EC105924-47
TEST EQUIPMENT	KELVIN MODEL 503 MILLIAMMETER F-1562	CAL DATE 2-22-78	TEST CONDITIONS CAL
H-P 3480A DIGITAL VOLTMETER	F-0392	3-6-78	Room Ambient
H-P 3489A DATA MUNCH	F-0103	N/A	30 MILLIONAIS Full Scale
			K=2.292

#1 Row A	#1 Row B	#2 Row A	#2 Row B
51.75	51.75	51.75	51.75
7 WIRES	7 WIRES	7 WIRES	7 WIRES
7.0	7.0	7.0	7.0
7.1	7.1	7.1	7.1
7.2	7.2	7.2	7.2
7.3	7.3	7.3	7.3
7.4	7.4	7.4	7.4
7.5	7.5	7.5	7.5
7.6	7.6	7.6	7.6
7.7	7.7	7.7	7.7
7.8	7.8	7.8	7.8
7.9	7.9	7.9	7.9
8.0	8.0	8.0	8.0
8.1	8.1	8.1	8.1
8.2	8.2	8.2	8.2
8.3	8.3	8.3	8.3
8.4	8.4	8.4	8.4
8.5	8.5	8.5	8.5
8.6	8.6	8.6	8.6
8.7	8.7	8.7	8.7
8.8	8.8	8.8	8.8
8.9	8.9	8.9	8.9
9.0	9.0	9.0	9.0
9.1	9.1	9.1	9.1
9.2	9.2	9.2	9.2
9.3	9.3	9.3	9.3
9.4	9.4	9.4	9.4
9.5	9.5	9.5	9.5
9.6	9.6	9.6	9.6
9.7	9.7	9.7	9.7
9.8	9.8	9.8	9.8
9.9	9.9	9.9	9.9
10.0	10.0	10.0	10.0

| NO. OF SAMPLES = |
|------------------|------------------|------------------|------------------|
| 25 | 25 | 25 | 25 |
| MEAN | MEAN | MEAN | MEAN |
| 7.5 | 7.5 | 7.5 | 7.5 |
| STD. DEV. | STD. DEV. | STD. DEV. | STD. DEV. |
| 0.9 | 0.9 | 0.9 | 0.9 |
| MINIMUM | MINIMUM | MINIMUM | MINIMUM |
| 6.6 | 6.6 | 6.6 | 6.6 |
| MAXIMUM | MAXIMUM | MAXIMUM | MAXIMUM |
| 9.4 | 9.4 | 9.4 | 9.4 |
| STD. DEV. % | STD. DEV. % | STD. DEV. % | STD. DEV. % |
| 11.4 | 11.4 | 11.4 | 11.4 |
| A.V.L. | A.V.L. | A.V.L. | A.V.L. |
| 7.5 | 7.5 | 7.5 | 7.5 |

REF EWOM G997. EC10592-36.	Bendix 	Electrical Components Division Sparta, New Jersey 10206	TESTED BY ER. SPARROW R. D. WAGNER APPROVED BY WITNESSED BY
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LABORATORY DATA SHEET

TEST CONTACT RESISTANCE - AFTER 1000 CYCLES OF DURABILITY				DATE OF TESTS 11-3-78	REPORT NUMBER 2375
TEST SPECIMEN ISI 10-502592-150 MILS, 10-502562-150 DB				TEMP. 70°F	ECL 0092A-78 REV A
	L1 4324	SPEC			
TEST EQUIPMENT	KEMMLY MODEL 593 MILLIAMMETER CAL DATE E-1662 12-22-78	DUE DATE 3-8-79	SPEC. LIMITS		
H-P 3480A DIGITAL VOLTMETER E-0392	3-6-78	3-6-79	TEST CONDITIONS		
H-P 3489A DATA FUNCTION E-2103	N/A	N/A	Room Ambient		
			30 MILLIONADS FULL SCALE		
			Kx2.292		

#1 Row A

1-25
MB 5 WIRES

#1 Row B

1-25
MB 5 WIRES

#1 Row A

26-50
MB 6 WIRES

#1 Row B

26-60
MB 6 WIRES

NO. OF SAMPLES	% OF SHIELDED	NO. OF COMPLEX	NO. OF SIMPLES
MANIFOLD =	90.0	MANIFOLD =	10.0
NEON =	9.0	NEON =	8.0
MONOFIL =	5.0	MONOFIL =	5.0
STAINLESS STEEL	1.0	STAINLESS STEEL	1.0
INSULATED	1.0	INSULATED	1.0
REF	EWNW G997.		
	ECL0092-36.		

REF
EWNW G997.
ECL0092-36.



Electrical
Components
Division

5500 NEW YORK 10036

TESTED BY T.R. BAIRD
R.D. WAGHORN
APPROVED BY

WITNESSED BY

LABORATORY DATA SHEET

TEST	CONTACT RESISTANCE - AFTER 1000 CYCLES OF DURABILITY	DATE OF TESTS	REPORT NUMBER
TEST SPECIMEN IS:	A-502592-150 MB, 1D-502592-150 DB	11-3-78	2375
		TEMP 74°F 36% RH	ECLO592A-49
	LT 7324	SPEC	PASA
TEST EQUIPMENT	KEMTRAY MODEL 503 MILLIONOMETER	CAL DATE 5-16-72	SPEC LIMITS
H-P 3480A DIGITAL VOLTMETER	F-9392	12-22-78	TEST CONDITIONS
H-P 3489A DATA PUNCH	F-2103	N/A	Room Ambient
			30 MILLIONOHMS FULL SCALE
			K=2.292

#2 Row A

1-25
DB 1 BENT WIRE

#2 Row B

1-25
DB 1 BENT WIRE

#2 Row A

26-50
MB 1 BENT WIRE

#2 Row B

26-50
MB 1 BENT WIRE

1-25
DB 1 BENT WIRE

NO. OF SAMPLES	NO. OF SAMPLES	NO. OF SAMPLES	NO. OF SAMPLES
25	25	25	25
MINIMUM	MINIMUM	MINIMUM	MINIMUM
MAX.	MAX.	MAX.	MAX.
MEAN	MEAN	MEAN	MEAN
STD. DEVIATION	STD. DEVIATION	STD. DEVIATION	STD. DEVIATION
COVARIANCE	COVARIANCE	COVARIANCE	COVARIANCE
CONFIDENCE	CONFIDENCE	CONFIDENCE	CONFIDENCE

REF EWON G997.
ECLO592-36.



Electrical
Components
Division

1000 New York 10030

TESTED BY T.R. BAIRD
R.D. WAGNER

APPROVED BY

WITNESSED BY

LABORATORY DATA SHEET

TEST	CONTACT RESISTANCE - AFTER 1000 CYCLES OF DURABILITY	DATE OF TESTS	REPORT NUMBER
	TEST SPECIMEN IS 10-502562-150 AND 10-502562-150 DD	11-3-78	2375
TEST EQUIPMENT	KEMMLY MODEL ED3 MILLIONOHMMETER E-1662	CAL DATE 2-22-78	TEMP 74°F 36% RH
H-P 3480A DIGITAL VOLTMETER	E-0392	DUE DATE 3-8-79	SPEC LIMITS
H-P 3489A DATA PUNCH	E-2103	N/A	TEST CONDITIONS Room Ambient 30 MILLION OHMS FULL SCALE $K=2.292$

#1 Row A

51-75
7 WIRES

#1 Row B

51-75
7 WIRES

#2 Row A

51-75
7 WIRES

#2 Row B

51-75
7 WIRES

NO. OF SAMPLES	NO. OF SAMPLES	NO. OF SAMPLES	NO. OF SAMPLES
TEST ITEM 1	900000000	900000000	900000000
VERA	900000000	900000000	900000000
PROBLEMS	1000000000	1000000000	1000000000
-100,000,000	-100,000,000	-100,000,000	-100,000,000
WELD	1000000000	1000000000	1000000000

EWOM G997.
ECLO592-36.



Electrical
Components
Division

5000, New York 10036

TESTED BY T.R. BAIRD
R.D. WAGHORN
APPROVED BY

WITNESSED BY

The Bendix Corporation
Electrical Components Division
Sidney, New York

REPORT NO.
2375
PAGE

APPENDIX B
Photographs

ER-2375

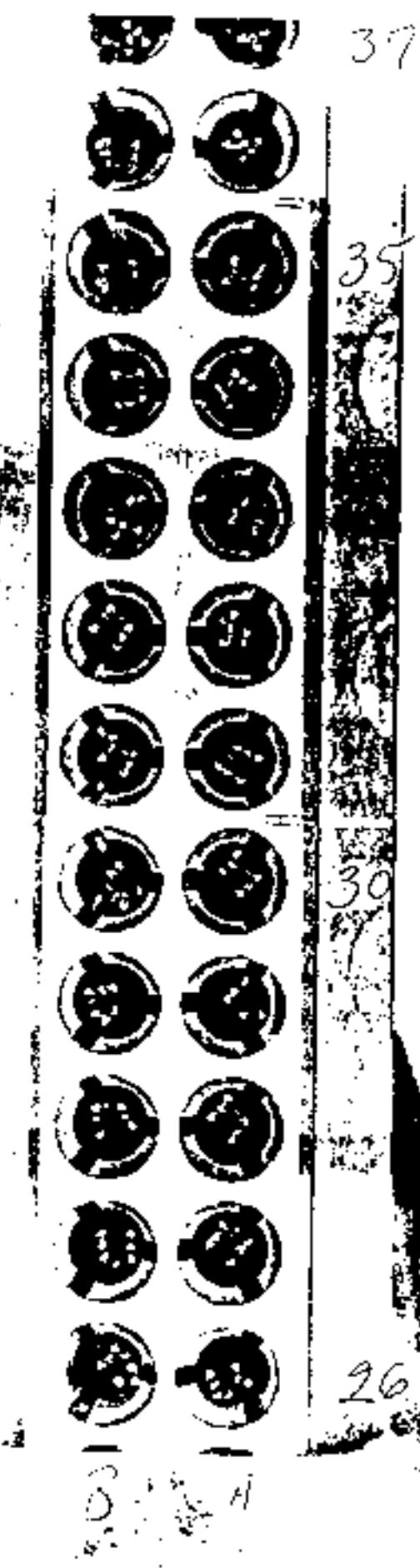


FIGURE 1

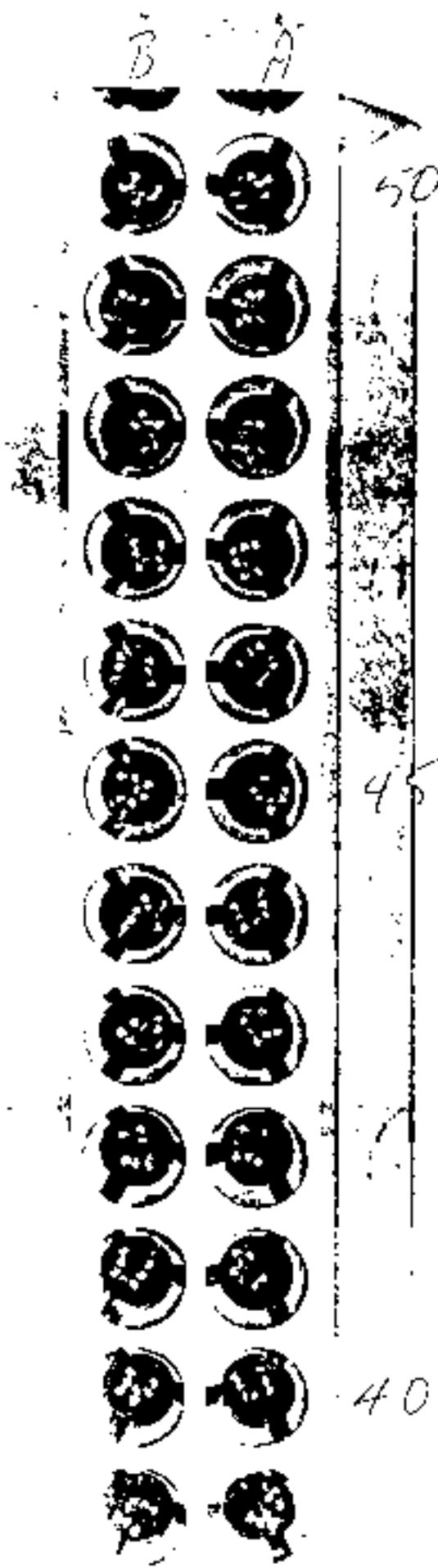


FIGURE 2

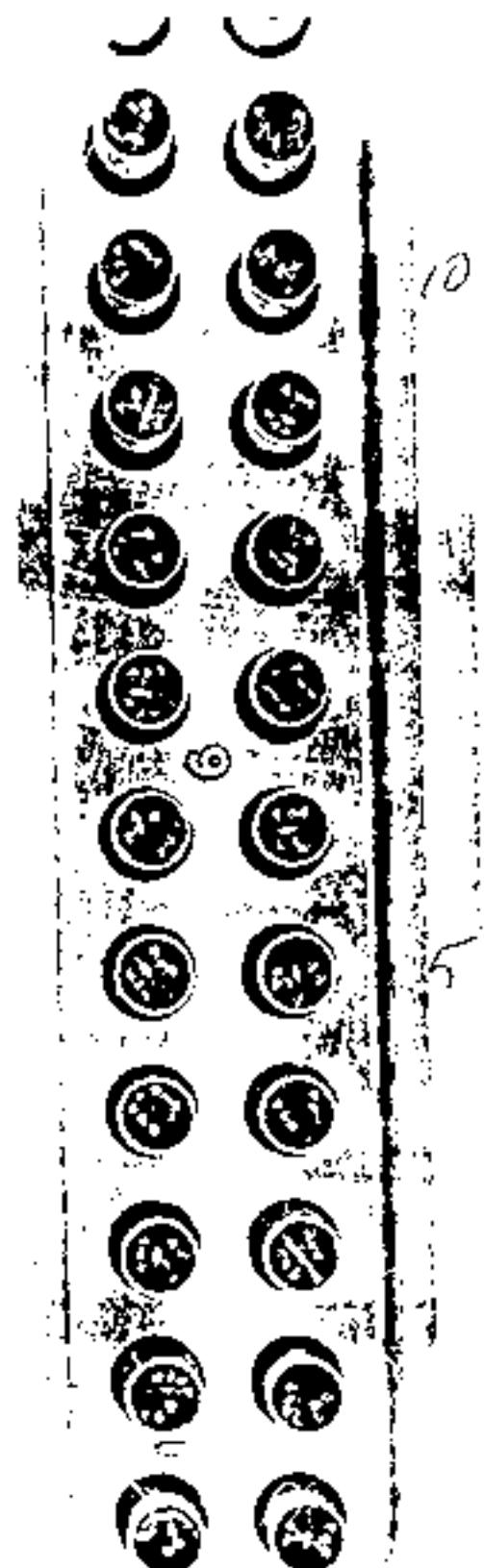


FIGURE 3

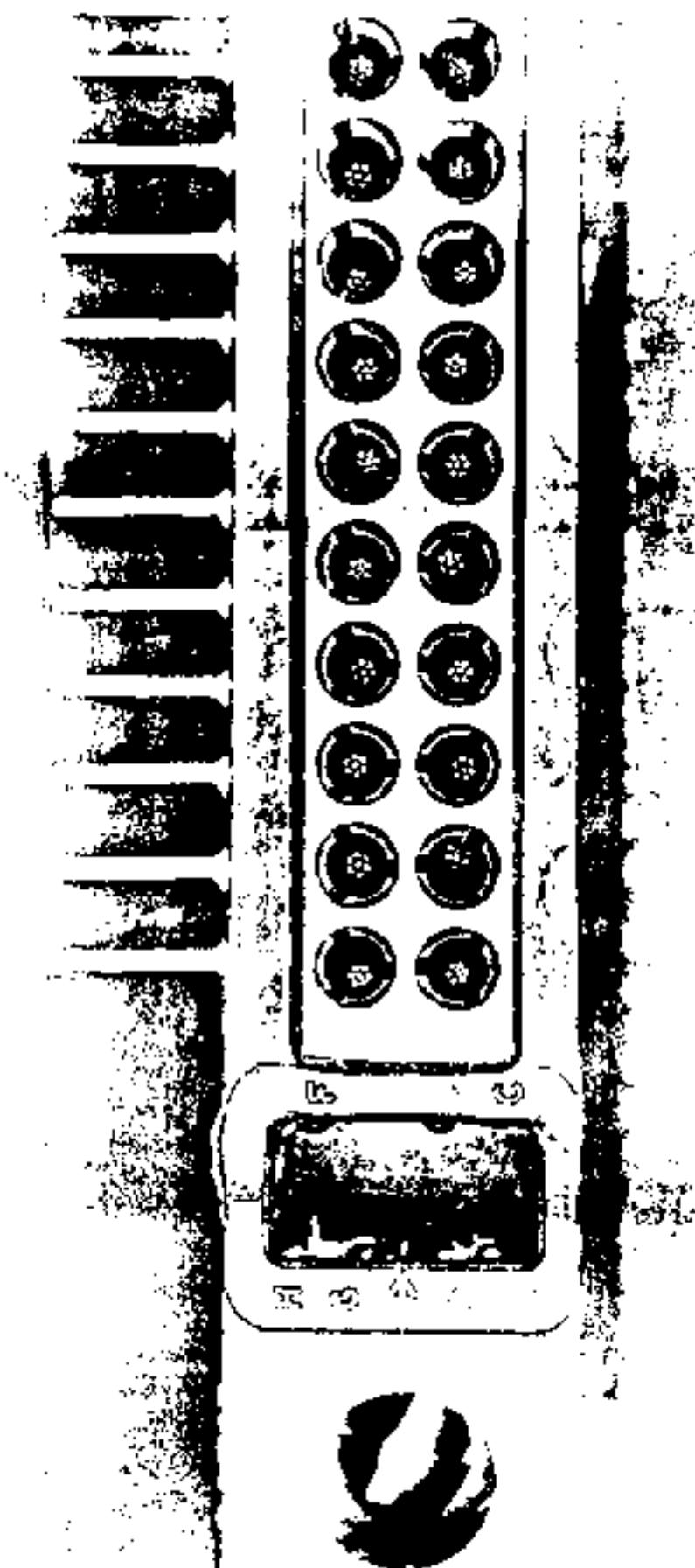


FIGURE 5



FIGURE 6

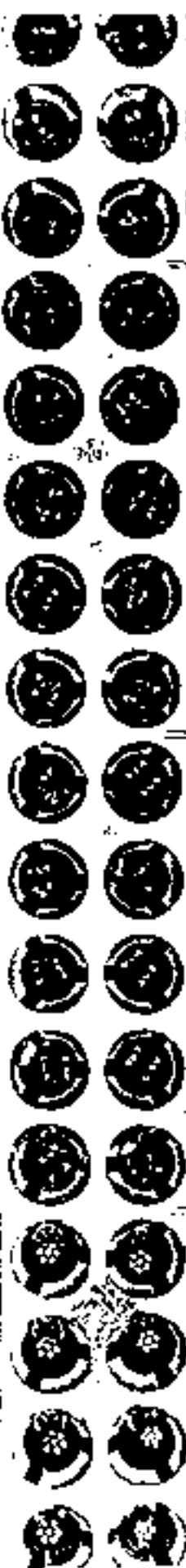


FIGURE 7



FIGURE 8

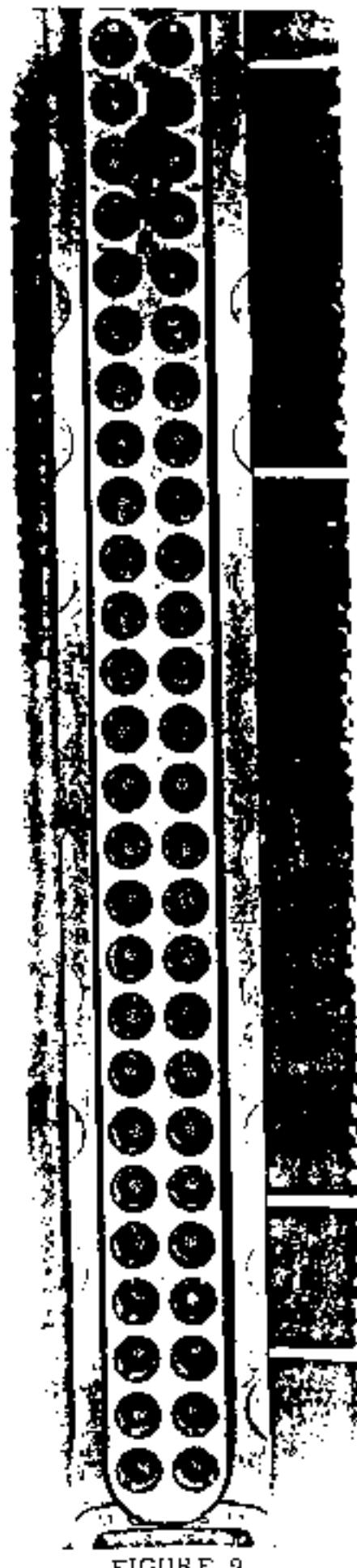


FIGURE 9

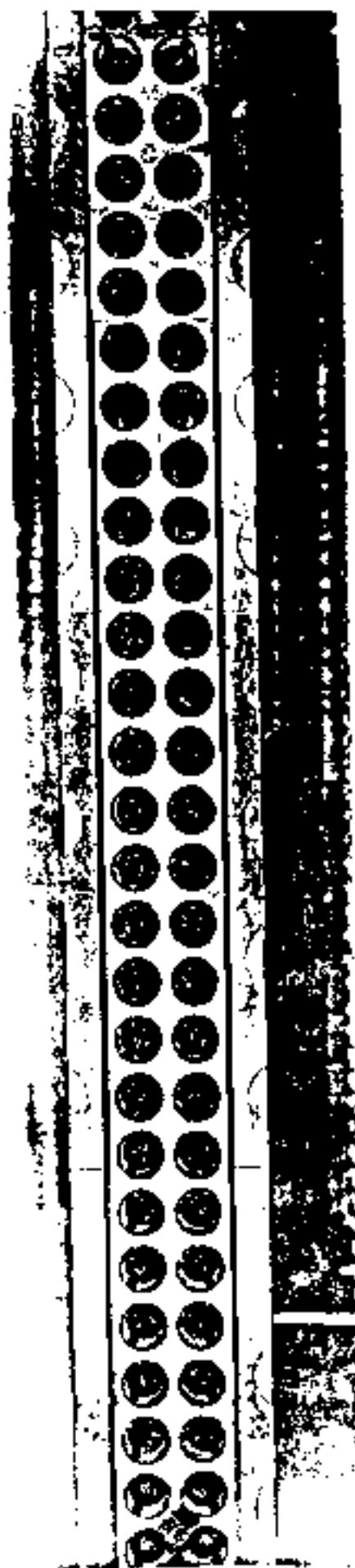


FIGURE 10

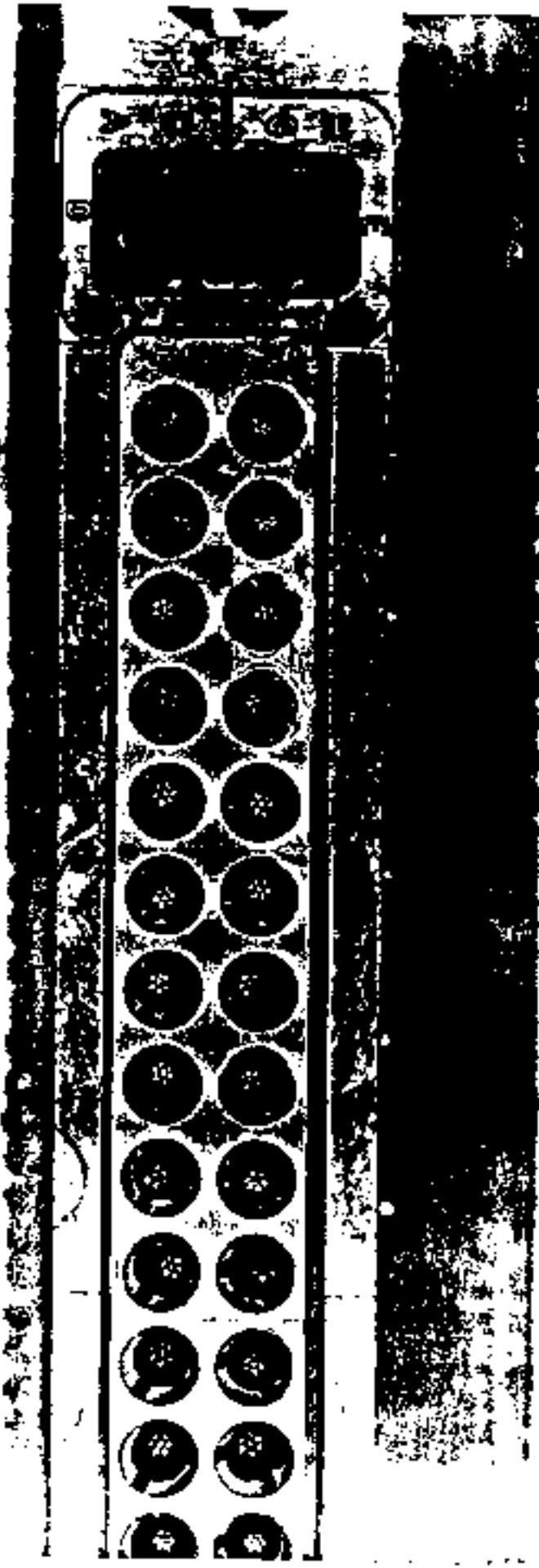


FIGURE H

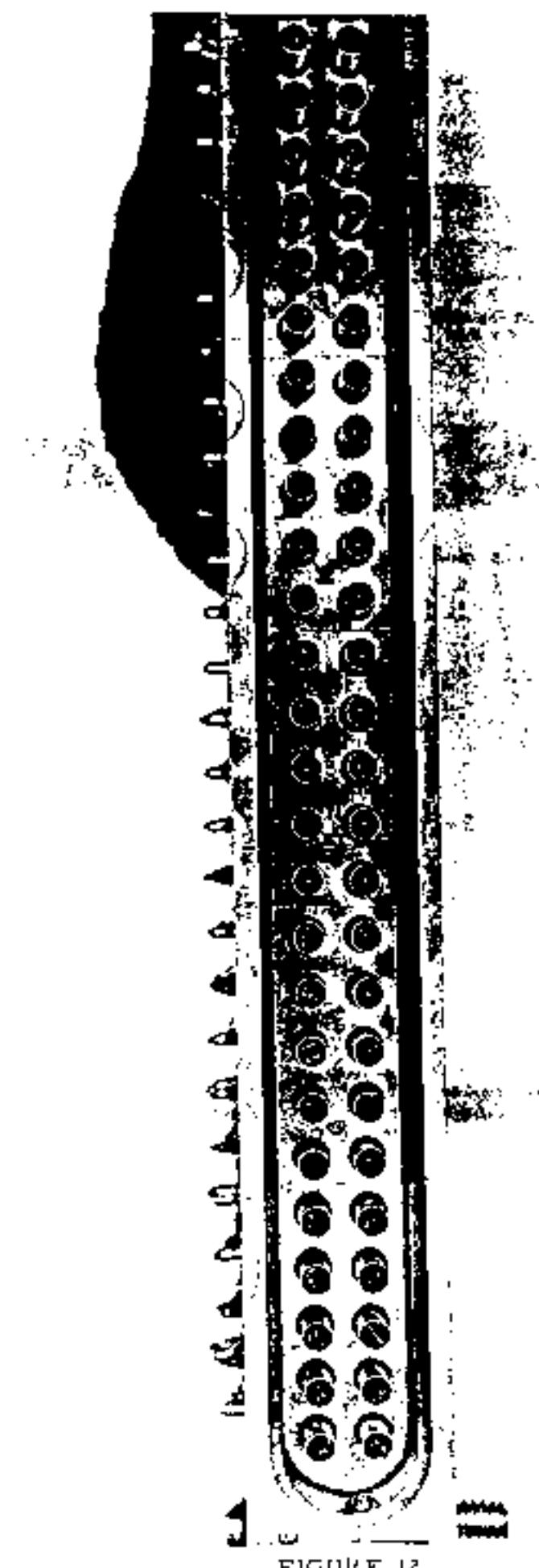


FIGURE 12